This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representation of The original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images, please do not report the images to the Image Problem Mailbox.

The Role Of The
Video Intubating
The Management
Difficult Airway

Kaplan, M.D.; Denham Ward, M.D., Ph.D.,
Hubber, M.D.; Barbara Van De Wiele, M.D.;
George Berci, M.D.

The Role Of The Universal Video Intubating System In The Management Of The Difficult Airway

Kaplan, M.B.; Ward, D.; Chhibber, A.;
Van De Wiele, B.; Berci, G.

Copyright:
© Published by Endo-Press, Tuttlingen, 2000
ISBN 3-89756-058-5, Printed in Germany
P.O. Box, D-78503 Tuttlingen
Phone: +49 / 74 61/1 45 90
Fax: +49 / 74 61/708-529

Other foreign language editions are available on request. For additional information please contact **Endo-Press** Tuttlingen, Germany, at the address shown above.

Typesetting and Lithography:
Endo-Press, D-78532 Tuttlingen, Germany
Eller repro+druck, D-78056 VS-Schwenningen, Germany

Printed by:
Straub Druck GmbH
D-78713 Schramberg, Germany

09.2000-2

All rights reserved. No part of this publication may be translated, reprinted or reproduced, transmitted in any form or by any means, electronic or mechanical, now known or hereafter invented, including photocopying and recording, or utilized in any information storage or retrieval system without the prior written permission of the copyright holder.

CONTRIBUTORS

Marshal B. Kaplan, M.D.
Associate Clinical Professor
Department of Anesthesiology
UCLA School of Medicine
Attending Anesthesiologist
Cedars-Sinai Medical Center
Los Angeles, California

Denham Ward, M.D., Ph.D.
Professor and Chairman
Department of Anesthesiology
University of Rochester
Rochester, New York

Ashwani Chhibber, M.D.
Associate Professor of Anesthesiology
University of Rochester
Rochester, New York

Barbara Van de Wiele, M.D.
Associate Professor of Anesthesiology
UCLA School of Medicine
Los Angeles, California

George Berci, M.D.
Clinical Professor of Surgery
University of Southern California
Director of Endoscopic Research
Cedars-Sinai Medical Center
Los Angeles, California

Th Contributors gr atly appr ciate th g nerous support of Karl Storz GmbH & Co. KG, Tuttling n, G rmany

Content

Part I

The Flexible Video Intubating Scope (Adult)

1. The Flexible Video Intubating Scop

One of the great landmarks in the evolution of anesthesia was the introduction of Flexible Fiber Endoscopes to facilitate the management of the difficult airway. There are many indications. Among them are: anatomical variations, anomalies, arthritis in the temporal mandibular joint, tumors in the oral cavity, morbid obesity with a short neck, or the inability of the patient to open his mouth. Transnasal intubation was described by Ikeda, who introduced the broncho fiberscope in 1968. Taylor and Toway, in 1972, drew attention to the importance of arming a flexible endoscope with an Endotracheal Tube (ETT) as an aid to intubation in difficult cases

Ovassapian reported the advantages of flexible scopes in 1981, and a few years later he discussed this topic in detail in his monograph. Norton (1996) and Kleeman (1997) published textbooks describing indications and techniques of this type of intubation.

When using a double lumen tube in thoracic surgery, the flexible endoscope is the standard for confirming proper tube position.

The flexible fiberoptic scope is useful when performing intubation through a standard laryngeal mask airway (LMA)

Introduction

Teaching flexible fiberoptic intubation with video assistance is distinctly advantageous in every training program. The incidence of using of flexible intubation varies from institution to institution. It depends on the profile of the case material as well as the availability of anesthesiologists who are skilled in the technique.

In every endoscopic procedure, the skill and knowledge of the operator, as well as the volume and experience, determine the final success. In general practice the use of a flexible scope is uncommon and probably does not exceed 5 – 10% of the total number of cases depending on the profile of the institution. Anesthesiologists working in larger tertiary hospitals can usually depend on a few colleagues who have more experience and are designated to perform the procedure in **anticipated difficult airway cases**. The real problem surfaces in **cases of unexpected difficult airways** when the operator has limited experience or skill to convert to the flexible technique.

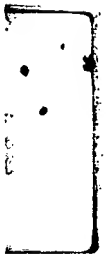
Endoscopy has made enormous progress in the last three decades because of better image relay systems and video techniques, which display the magnified object. Looking through an endoscope with a small eyepiece, it is sometimes difficult to adapt one's vision to this small pupil or to perceive the details of subtle color changes.

In more complex procedures, the role of assistants who can provide a second pair of hands is vital. The assistant is essential because he/she provides coordination to complete procedures expeditiously and appropriately. This is the reason why, in gynecology today, almost 50% of all operations are performed using the television monitor. In gastroenterology, endoscopic sphincterotomies, PEG or other complicated procedures are done under television control. Recently, the laparoscopic revolution changed general surgery such that 30 – 35% of operations are done utilizing the television screen. The results and advantages are obvi-

ous: the enlarged image can be seen from an optimal distance with both eyes and the magnified anatomy, as well as anomalies, are much better perceived than when looking through a small monocular eyepiece. The involvement of an assistant is required to obtain coordinated movements in many endoscopic operations.

Anesthesia has been lagging behind this movement and, in our opinion, we have arrived at a crossroad. Many anesthesia procedures can be performed more safely and quickly with a TV monitor. Even individuals who have less experience can more easily perceive where the tip of the scope is, how it should be maneuvered in the oral cavity and hypopharynx (to find the vocal cords) and pass the scope safely into the trachea.
After the endotracheal tube (ETT) is advanced over the flexible scope, the scope is withdrawn and the patient's ETT is connected to the anesthesia circuit. The reintroduction of the scope through an adapter and through the ETT allows confirmation of the position of the ETT.

We employed the video system described below in a prospective collaborative study in six institutions. We have collected over 600 successful intubation cases and published our first results in 1999.



The Universal Video Intubating System

In reality, we developed not only a flexible scope, which was previously available on the market, but one with a TV camera integrated into the handle. This has the following advantages:

a. It is ergonomically well suited for the operator. It does not require time to attach. It does not require continuous focusing. The anesthesiologist can concentrate on the task of intubation.

b. The total OD is 3.7 mm which allows it to be easily armed with an ETT as small as 5.0 mm. It is not uncommon that the nasal passages of some patients will not accommodate a tube of 7.0 mm or even 6.5 mm OD. It is advantageous to be able to utilize the smaller tubes to avoid trauma in such cases.

c. When a flexible scope is attached to a TV camera a Moiré pattern of the fiber structure usually appears. In the new video intubating scope this Moiré structure is eliminated electronically (U.S. Patent 5,751.340/98) creating a smooth image which is easier to observe.

d. There are logistical problems in every OR, especially in smaller rooms, where the heavy anesthetic machine is located on the right side of the patient. The medication cabinet is usually located behind the anesthesiologist. We have only a small area on the patient's left available to work. In many complex procedures (e.g., neuro or cardiac surgery) the entire OR is already packed with complex machinery. We designed a smaller cart where the TV control unit, the light source and the video tape recorder are placed with other essentials and can be easily positioned.

e. This cart has a swivel arm with a small 8-inch TV monitor, which can be positioned above the chest of the patient. The anesthesiologist can manipulate and observe the image in the same axis without additional stress of watching an image display system at one side of the table.

f. The same cart, with its accessories, can be used with a smaller 2.8-mm OD pediatric intubating scope with an integrated Micro Video Module (MVM) camera as well as with the

new Video Macintosh Intubating Laryngoscope which employs standard blades and handles but displays the enlarged image instead of looking through a "keyhole".

g. An oxygen tank is attached to the side of the cart. We found it beneficial to administer oxygen through the instrument channel (1.5 mm) of the adult scope or pediatric scope (1.2 mm channel) during the intubation procedure because the distal optic at the tip is kept clear by this positive pressure and, in addition, the patient is better oxygenated.

In the past six months we have come to the following conclusions using this unit:

a. Video intubation is the method of choice in teaching. The attending anesthesiologist can clearly demonstrate to the residents the anatomy and the "tricks of the trade" to avoid complications. On the other hand, when the resident performs the procedure, the tutor can precisely observe the performance and correct inappropriate or ineffective manipulations.

b. We also found that ancillary manipulations (e.g. pressure on the larynx or mandibular lift) are much more efficiently performed using video display than when observing through an eyepiece. In general, if there is a problem with intubation the anesthesiologist will ask the circulating nurse to perform one or the other manipulations described above. With the aid of video display, both parties can simultaneously observe when the vocal cords are in optimal position and the ETT or flexible scope can be introduced safely. This cannot be done if these manipulations are performed blindly.

All in all, video intubation provides the anesthesiologist with a tool which contributes to a safer, faster, and more certain intubation. It is advantageous for those who have less experience when doing more difficult cases. It allows for coordinated assistance.

An added bonus is the possibility of recording the procedure on videotape and displaying it at a consultation or lecture series, or showing it to the student for educational purposes.

Video technique has proved to be a very important adjunct in the hands of the authors. It is a significant step in managing the difficult airway and in teaching this more complex airway management procedure.

Hints for the Anesthesiology Residents in Training

Make sure after you arm the flexible scope with the endotracheal tube (ETT) that the ETT is lubricated (with your standardized lubricant).

After the flexible scope is successfully introduced (under tele-visual control) into the trachea, that before you start to remove the fiberscope from the ETT **put the bending lever on the scope into the neutral position and release your thumb from the lever.**

If this important hint is forgotten it can result in a broken scope. If the pull-through maneuver is difficult (you will feel resistance), hand the grip of the scope to the nurse and try to rotate the ETT while the other hand holds the shaft of the scope. Pull the ETT back a little bit and try to gently advance it. Do not force it. If you think you are in the trachea and connect the ETT to your anesthesia circuit, re-advance the flexible scope through the ETT via a ventilator adapter just to make certain:

a. you are in the trachea.

b. that the ETT is in optimal position.

It is advisable to immerse the ETT in hot water before it is armed to make it softer. This is especially useful for nasotracheal intubation.

Required steps before use of the Fiberscope (FS):

Check the FS for any damage

- Examine the outside skin for any visible damage, particularly at the distal, active portion of the scope.
- Place your hand on the bending lever and observe the deflection of the tip. Deflection should be 140 degrees up/140 degrees down.
- Check the tip of the FS and determine if there are any scratches or dirt. Clean it with an alcohol swab if necessary.

Attach the Light Source

- Attach the Fiber Cable to the light source box and FS. The (Xenon) light intensity should be at maximum.

Oxygen Administration

- Attach oxygen tubing to FS and oxygen cylinder. Make sure the stopcock at the instrument channel is open. Oxygen is normally maintained at 2 – 3 liters per minute per physician's order.

Without MVM, Attach the Camera to the Eyepiece*

- Insert the camera plug into the camera control unit and switch the unit on. You will first see a color bar on the monitor screen.
- Look through the eyepiece from a one-inch distance and rotate the focusing knob slightly to the left and right until a clear, sharp image is observed. The manufacturer's adjustment is indicated with a white line. It is very important to do this before attaching the FS to the camera.
- Attach your camera head to the eyepiece of the FS.
  White balancing: Place a 4x4 white gauze one inch away from the tip of the FS and press the white balance button on the camera control unit until the "OK" sign appears. The light source should be a maximal intensity during the white balancing.

Arming the FS with the Endotracheal Tube

- Arm the FS with the endotracheal tube. The adapter of the ETT is best left on the tube. The curvature of the ETT should be identical with the maximum deflection of the FS.

* The use of an integrated MVM module eliminates the need to focus and automatically optimizes image quality. Only the white balancing needs to be done

Maintenance and Sterilization

Cleaning

The FS must be cleaned after each use **before** disinfecting or sterilizing. Gently cleanse the outside skin and FS with a soft sponge of a scrub brush or cloth using a mild soap.

- Rinse the instrument channel with a syringe. Dry it by pushing air through with an empty syringe. Dry the outside (FS) with a soft cloth.

Sterilizing/Disinfecting

- **Immersion technique: Formalin, Glutaraldehyde** or a similar solution is used in this disinfecting process. **The ventilation valve is closed and the red cap removed**. The stopcock on the instrument channel should be open. Immerse the FS according to OR regulations. Follow the manufacturer's instructions for immersion time, as the FS may become damaged if left soaking too long in these chemical solutions.

  After immersion time, transfer the FS with sterile gloves to a distilled water base for the predetermined time. The working channel should also be rinsed with distilled water. Dry according to hospital policy.

- **Gas Sterilization (Ethylene Oxide):** This technique is utilized by placing the FS in a tray with the **red valve cap inserted to keep the valve open**. Open the stopcock on the instrument channel. After processing, make sure the red valve cap is removed and placed in its appropriate place.

- **Steris**: This is a method of fluid sterilization with low pH used in the USA with preprogrammed cycles including rinsing. After the FS has been appropriately sterilized, dry the outside per hospital protocol, and blow air through the instrument channel. **The red cap is removed in this process and the ventilation valve closed.**

Never autoclave a flexible intubation scope.

PART II

The Flexible Video Intubating Scope (Pediatric)

(A. Chhibber, M.D.)

Pediatric Intubation

General anesthesia is the most common method of providing anesthesia to neonates, infants and children. A significant number of patients in a pediatric hospital may require management of a difficult airway. The approach to a difficult airway must include a careful physical examination and availability of various helpful devices other than conventional methods of intubation (direct laryngoscopy). A number of conditions in children, which may be congenital or acquired, may make an airway difficult. These include Pierre Robin syndrome, Treacher Collins syndrome, Goldenhar syndrome secondary to hypoplasia of mandible and/or maxilla, or cervical spine trauma, burns and contracture of the neck and nasotracheal neoplastic tumors.

Introduction of fiberoptic flexible pediatric scopes have revolutionized the management of difficult airways. We provide over 5,000 anesthetics to neonates and children at our hospital and we frequently run into patients with difficult airways, some of them unanticipated. The flexible fiberoptic pediatric scope is an important tool in our difficult airway cart for pediatric patients. Neonates and young children have relatively small tracheas and a relatively small angle between the two bronchi when compared with adults. This increases the risk of endobronchial intubation, especially when the head position is changed for various surgical procedures. The Pediatric flexible fiberoptic scope is also useful in confirming placement of the endotracheal tube in such situations. In children requiring selective one lung ventilation, it is imperative to confirm the position of the endotracheal tube (ETT) in the desired bronchus or to confirm the placement of the broncheal blocker in the appropriate place. This scope can be used for tracheal intubation via oral and nasal routes. Via the oral route it may be used with or without insertion of a laryngeal mask airway (LMA) and with help from an assistant using rigid laryngoscope. At our institution, the fiberoptic scope is part of our "Difficult Airway Cart". It is also used in otherwise simple airways for teaching purposes. The Video Intubating System has further revolutionized not only management of the difficult airway in children but also has made it safer for teaching residents and anesthesiologists compared with traditional flexible fiberoptic scopes.

Our Experience with Video Intubating System

The KARL STORZ Video Intubating Unit was used to intubate the trachea of pediatric patients and also to confirm the position of the ETT's and LMA's. The Video Intubating Unit consists of a 2.8 mm, 50 cm flexible pediatric scope with an integrated TV camera (Micro Video Module = MVM) a light source, a color monitor and a videocassette recorder. This unit has been placed on a small cart and the monitor is mounted on a swivel arm, which can be positioned as desired. The 2.8 mm flexible scope has a 1.2 mm channel for oxygen delivery and can easily pass through 3.5 mm (internal diameter) ETT.

Initially, we used this pediatric videoscope to confirm the correct placement of ETT's in already intubated children undergoing surgical procedures since endobronchial intubation due to position changes or inadvertent placement of the ETT into one of the main bronchi is a common complication in infants and young children. This gave us some experience in using this scope effectively. It is worthy to note that the flexible pediatric scope in this unit has a tip bending lever which bends the tip of the scope in the same direction of movement of the bending lever, unlike other scopes where the tip bends in the opposite direction of the movement of the bending lever.

After introducing this video intubating system in our department, another pediatric anesthesiologist also started using it. The overall impression was very positive (a magnified image, easy to use and ability to provide oxygen during the process of intubating the trachea). In our initial experience, it appears to be a definite improvement over existing pediatric fiberoptic intubating scopes. We intubated approximately 50 infants and confirmed correct placement of the LMA in approximately 25 children.

After using it for almost a year, our opinion is that:

It is a safe and convenient tool not only for managing the difficult airways but also for teaching residents (more than one at a time) and observing and assisting in enhancing the performance of the trainee.

1. The Video display helps the assistant to provide appropriate maneuvers, including pressure on the larynx, mandibular (jaw) lift or head and neck position changes of a neonate or a child.

2. Video recording during intubation and a magnified image make it a good teaching tool in and out of the operating room.

3. Very useful in difficult pediatric airways.

4. Instrument channel (1.2 mm) for delivering oxygen provides a safer environment while intubating spontaneously ventilating anesthetized pediatric patients.

Maintenance and storage of pediatric videoscope is similar to the adult one. Only trained personnel/technicians should handle this equipment for sterilization/disinfection.

PART III

Instruction and Guidelines for the MacIntosh Video Laryngoscope

The MacIntosh Video Laryngoscope

Since the introduction of the laryngoscope to clinical anesthesia practice, innovators in anesthesia have attempted to improve upon and perfect the design of the laryngoscope blade. The goal of these innovators has been to improve visualization of laryngeal structures and increase the likelihood of successful tracheal intubation. Unfortunately, despite these modifications, on occasion intubation of the trachea cannot be accomplished with facility, even in patients with anatomy that does not predict difficult intubation.

It is our estimate that endotracheal intubation is performed on some 8 million patients per year in the United States. Our assessment is of these endotracheal intubations; approximately 80% are performed by direct laryngoscopy with transoral placement of the endotracheal tube into the trachea. We have assumed that the incidence of unsuspected difficult intubation is at 3% or 240,000 events per year in the United States. One factor that contributes to difficult intubation is poor visualization.

The MacIntosh Video Laryngoscope is a design that optimizes visualization by presenting to the operator an enlarged video image of airway structures. In contrast, using conventional laryngoscopy, the anesthesiologists has only a "keyhole" view of the airway structures, a view that may be further obscured during attempts to pass the endotracheal tube.

The MacIntosh Video Laryngoscope consists of a laryngoscope handle and Macintosh blade that have been modified to provide a video image of airway structures on a screen which can be conveniently located directly in front of the anesthesiologists. A micro video module is contained in the modified handle. An image/light bundle is introduced in the standard blade. In our experience the device is extremely easy to learn to use because most anesthesiologists are familiar with the use of the Macintosh blade.

There are several potential advantages of a video image in the context of direct laryngoscopy. The system provides high quality video images that are enlarged on the video monitor for easier visualization. If laryngeal manipulation is required to improve visualization of laryngeal structures, the anesthesiologist and the person assisting can coordinate movements as they observe, simultaneously, the image on the video monitor. With the video image projected from the distal end of the laryngoscope blade, laryngeal structures are kept in view as the endotracheal tube is passed through the oropharynx into the trachea.

Finally, the video laryngoscope is a superb teaching tool that will be useful in the training of anesthesiologists and other physicians who require intubating skills.

The MacIntosh Video Laryngoscope has great potential. We predict that it will find an important niche as a teaching tool. We suspect that by providing a better view it may decrease the incidence of tissue trauma associated with intubation.

Bibliography upon request.

Instruction and Guidelin s for th Video MacIntosh Syst m

- It consists of the standard Macintosh blade.
- A standard sized handle with a 4 mm OD flexible image and light bundle, exiting the handle.

Assembly

- Plug the camera cable into the camera control unit and the light cord into the exit port of the light source.
- White-balance the TV picture and check the image quality (are there any broken fibers? Dirt on the tip? etc.).
- Insert the blade into the handle and thread the image light bundle (ILB) carefully through the light tube in the blade.
- Advance the ILB until the slot and the stopper flange is engaged.
- It may be helpful to place a few drops of defogger at the tip of the cover lens of the ILB.
- If desired, use the keyboard (in case of available VHS tape recorder), insert patient data, switch on the recorder for 3 – 4 seconds and then delete the data. This will help you to be sure that at the beginning of your tape record you have the patient's ID for the case.
- It is advisable to insert a malleable stylet to facilitate accurate direction of the ETT during the advancement into the trachea.
- When you have completed the procedure, place the Video Macintosh System on a little table. **NEVER pivot the blade on the handle without removing the image bundle,** otherwise you will break this expensive component.

Maintenance, Cleaning and Disinfection of the Macintosh Video Laryngoscope

- After use, carefully disconnect the camera and the light unit from the respective control units.
- Disconnect the image light bundle from the blade by pulling it out very gently.
- Remove the blade (photo) from the handle.
- You may insert it in any accepted disinfection fluid.

You may autoclave the blade.

Image Light Bundle (IL)

- After initial cleaning with a scrub brush follow institutional guidelines for disinfection and/or sterilization.

  a. Steris

  Insert it into the Steris unit tray for the prescribed time. After sterilization, dry the wet IL, handle, and image light bundle with a clean cloth. Dry the light cord and TV plug.

  b. Immersion

  You may immerse it in Glutaraldehyde (Cidex) for the prescribed time and then transfer it for 10 minutes to a sterile distilled water rinse. Dry the IL handle and TV light cable.

  c. ETO

  Using ETO (Ethyelene Oxide)

  - Wash and dry the IL as mentioned before and place it in a tray.
  - Appropriately cover the entire unit and use the standard ETO cycle.

(For specific details, ask the Company's representative)

After Disinfection

- Always attach the blade into the handle first.

- Introduce the IL gently into the guidetube.

- Observe the stopper and its slot so that it is appropriately positioned and keeps the unit safely stored in a tray or in a drawer of the cart. For further information call Karl Storz Endoscopy, Division of Anesthesia.

Never bend or try to disconnect the blade with the IL inserted. Always pull out the IL first.

Summarized Hints for Residents in Training and OR Personn l MacIntosh Video Laryngoscope

1. Consider preoperative administration of Glycopyrrolate and have suction readily available.

2. Check the equipment (scope, camera, light source, etc.) to make sure that it is in operative function. In case you have a video recorder, check the availability of the tape and remote control switch.

3. Before inserting the scope, check the white balance of the camera. If you intend to tape it put the patient's ID on the tape for a few seconds before starting and delete it.

4. Pull out the image light bundle and moisten the disposable square foam with the defogger fluid. Put a few drops on the sponge and touch the moistened sponge with the tip. Re-advance the IL into the guidetube and check the image (the simplest thing is to put the MacIntosh blade into your open fist).

5. Check the prepared endotracheal tube with the stylet in place.

6. After adequate depth of anesthesia, introduce the MacIntosh into the mouth and observe the anatomy on the screen

7. If you see the cords, introduce your endotracheal tube and ask the nurse to pull out the stylet if you are advanced through the cords.

8. If it is difficult to see the cords, ask the nurse or the assistant to apply laryngeal pressure or mandibular lift. If the cords appear, introduce the endotracheal tube slowly.

PART IV:

Legends and Illustrations

Illustrations for Video Flexible Intubating Scope

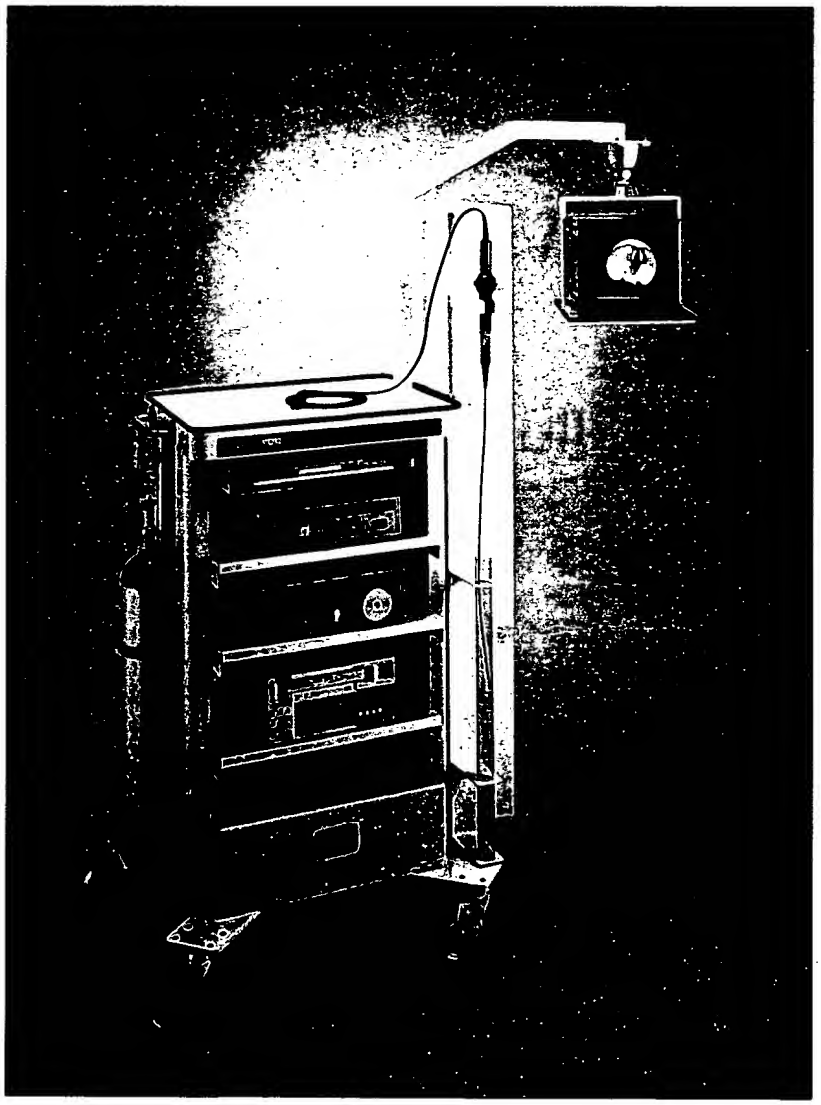


Fig. 1
The cart with a swivel arm and TV monitor.
The TV screen can be placed with ease above the patient's chest to facilitate manipulation and observation in one axis. The cart also contains the camera control unit, light source, and Video Tape Recorder (VHS). At the side, a cylinder is shown which provides oxygen insufflation in pediatric and adult flexible scopes. On the right, the flexible scope is seen with the integrated MVM camera, suspended ready to use. All flexible videoscopes, the MacIntosh Video Laryngoscope, and the video neonate intubating scope are operated using this single TV control unit.

Fig. 2
The flexible scope with the MVM is armed with an endotracheal tube. During advancement the enlarged view of the anatomy makes intubation easier.

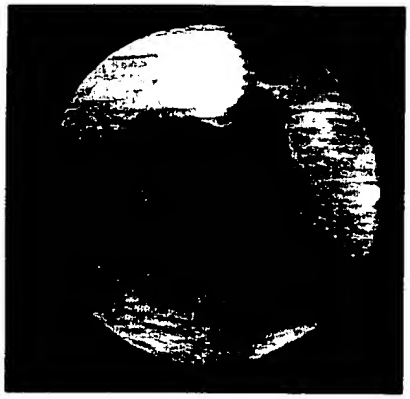


Fig. 3
After the back of the tongue is passed, the vocal cords come into view.

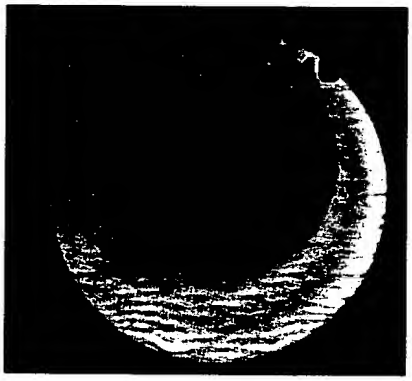


Fig. 4
With further advancement into the trachea the bifurcation is visible.

Fig. 6
Before you start to remove the scope from the endotracheal tube, the bending lever should be in neutral position and your thumb should release the lever just to make sure that during the pull-through maneuver the tip is in the free-movement position.

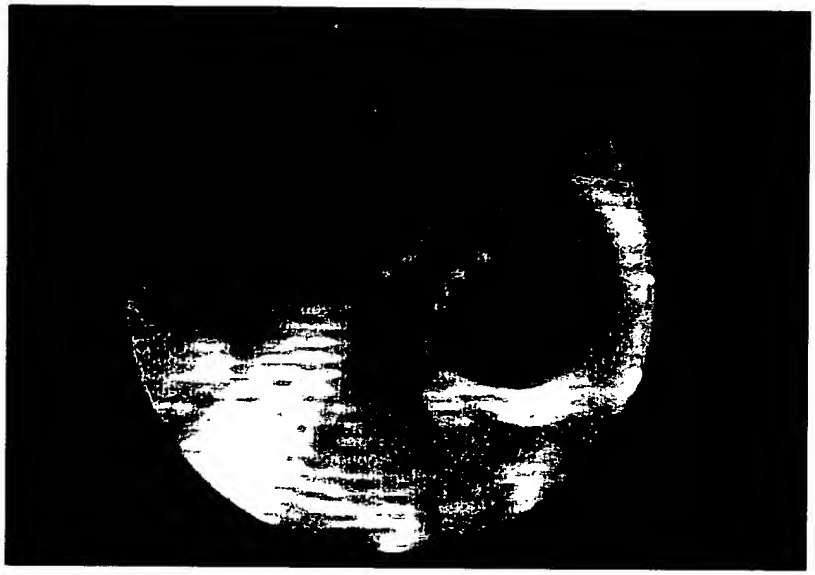


Fig. 5
The ETT is advanced over the scope into position.

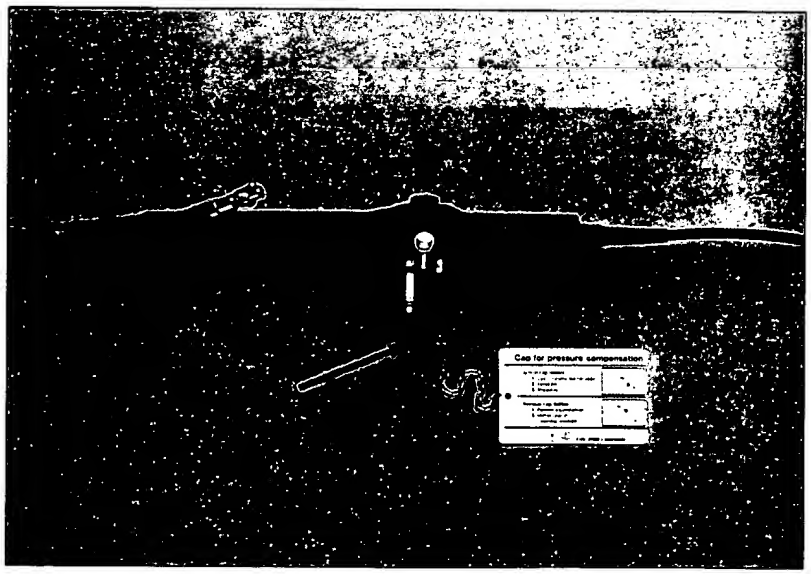


Fig. 7
The red cap should be removed from the ventilation valve if the flexible scope is sterilized or disinfected with any immersion technique. If not done, fluid will enter the system resulting in costly repairs. In case of gas sterilization (only on this occasion) the red cap has to be inserted to keep this valve open. When the instrument is returned after sufficient aeration, the cap has to be removed to keep the valve closed.

Illustrations for Video Flexible Intubation Scope (Pediatric)

Fig. 2
The scope is gently advanced under precise (Tele-) visual control. The tip of the ETT is intentionally slightly protruded as seen at 2 o'clock and the scope recessed to avoid injuries during the advancement.

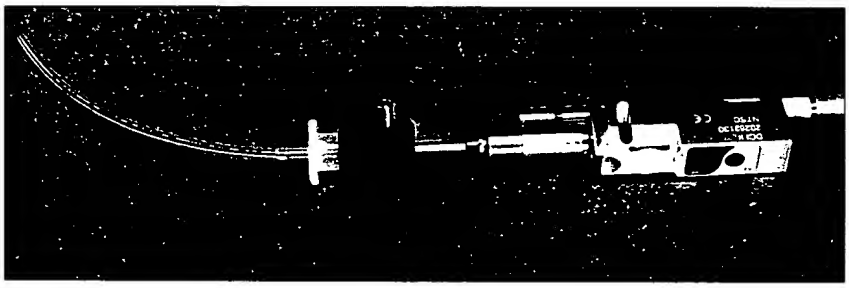


Fig. 1
The miniature curved Video Neonate Intubating Scope with an integrated (DCI) TV camera. The scope is armed with a 2.5 mm ETT. A special adapter permits adjustment to compensate the various lengths of the 2.5 mm – 3.5 mm ETT's and allows simultaneous oxygen administration between the scope and the ETT wall, an important aspect in pediatric intubation.

Fig. 2/A
The same vocal cord in a close-up position.

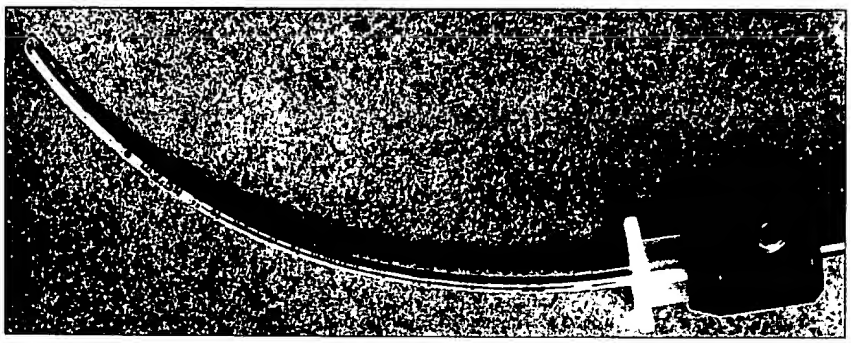


Fig. 1/A
The miniature scope armed with a 2.5 mm ETT in close-up. The adapter (with the 02 inlet) and a set-screw (not seen) secures the recessed scope and the slightly protruding ETT in position to avoid injuries during the introduction of the ETT.

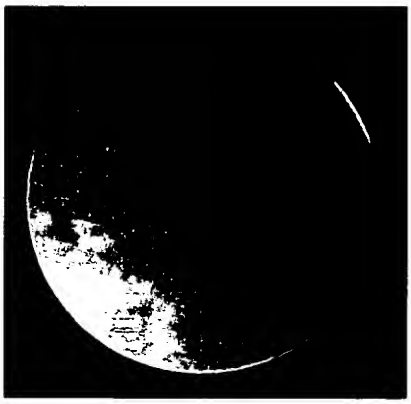


Fig. 3
The trachea before the ETT is pushed over the scope.

Illustrations for th MacIntosh Vid o Laryngoscope

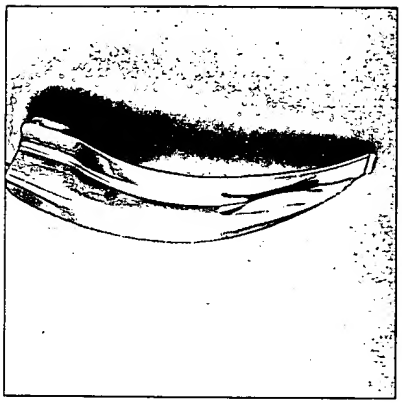


Fig. 1
A standard MacIntosh blade is employed.

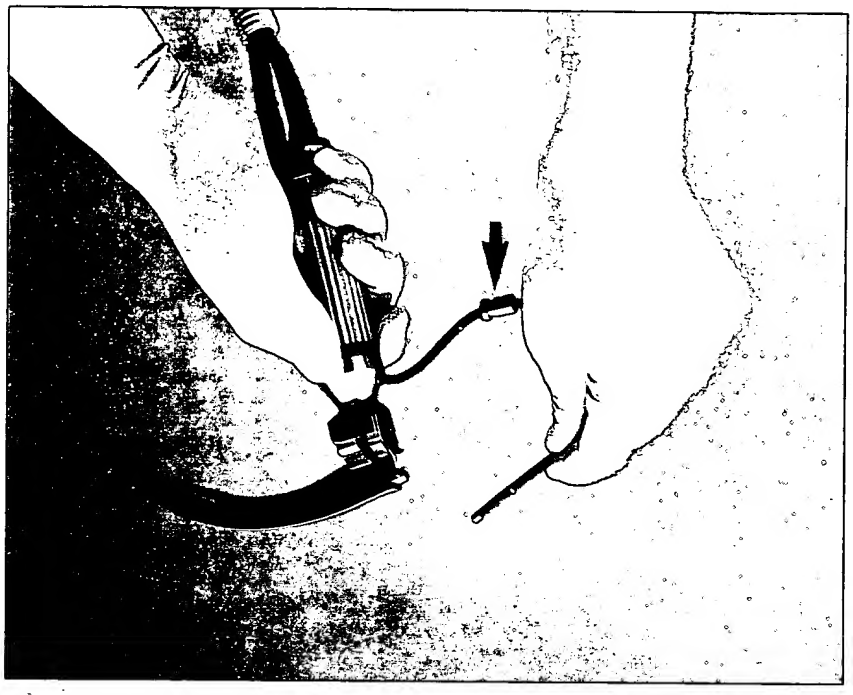


Fig. 2
In the standard handle the batteries were removed and replaced with a Micro Video Module (MVM). A flexible image and light bundle as shown (arrow) is exiting from the handle.

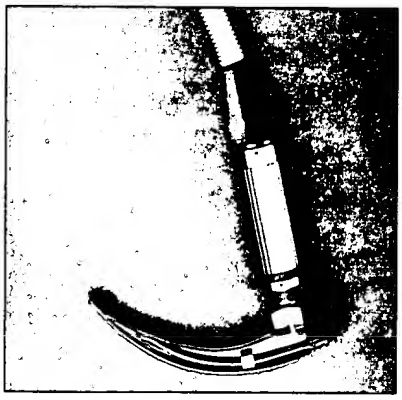


Fig. 3
The image and light bundle (IL) is inserted into the guide tube in the blade. It is recommended to use an anti-fog solution at the tip of the image bundle just prior to use.

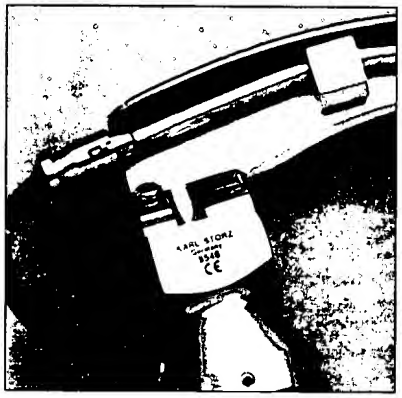


Fig. 4
A pin and a "stopper" inserted appropriately secures the position of the IL.

Fig. 5
The MacIntosh Video Laryngoscope is inserted.

Fig. 6
The MacIntosh Video Laryngoscope is advanced.

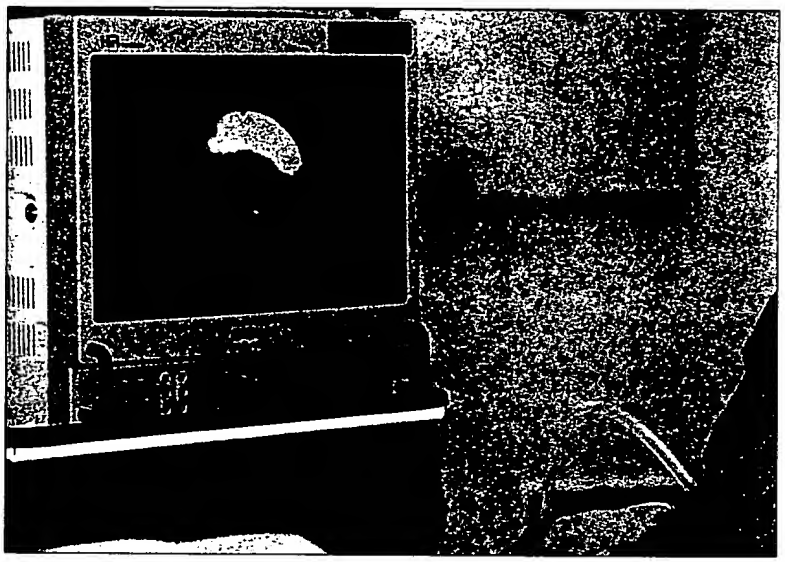


Fig. 7
By further slight advancement, the anatomy of the cords are clearly seen. If there are external manipulations required (laryngeal pressure or Mandibular lift) the assistant and the anesthesiologist can precisely see what the ideal position will be.

Fig. 8
Endotracheal tube with the stylet is advanced under precise visual control (note coordinated assistance – arrow – by circulating nurse).

Fig. 9
The advancement with the cuffed tube can be well seen on the TV monitor. This important movement is done safely and precisely. Everyone in the OR can clearly follow the procedure.

Fig. 10
The Video MacIntosh Intubating Scope is withdrawn under constant observation.

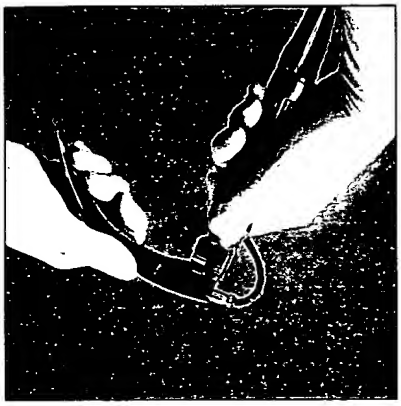


Fig. 11
Never bend the blade while the image light bundle is in operating position. First pull the **bundle completely out** and then remove the blade.

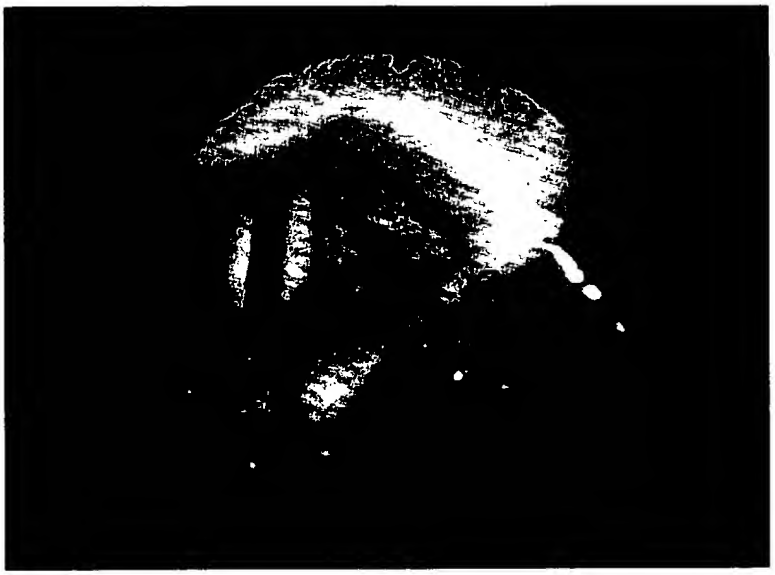


Fig. 13
Epiglottis and cords are well displayed.

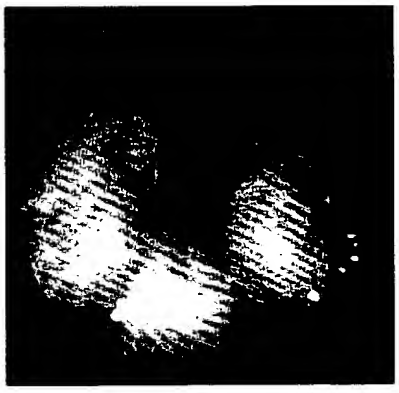
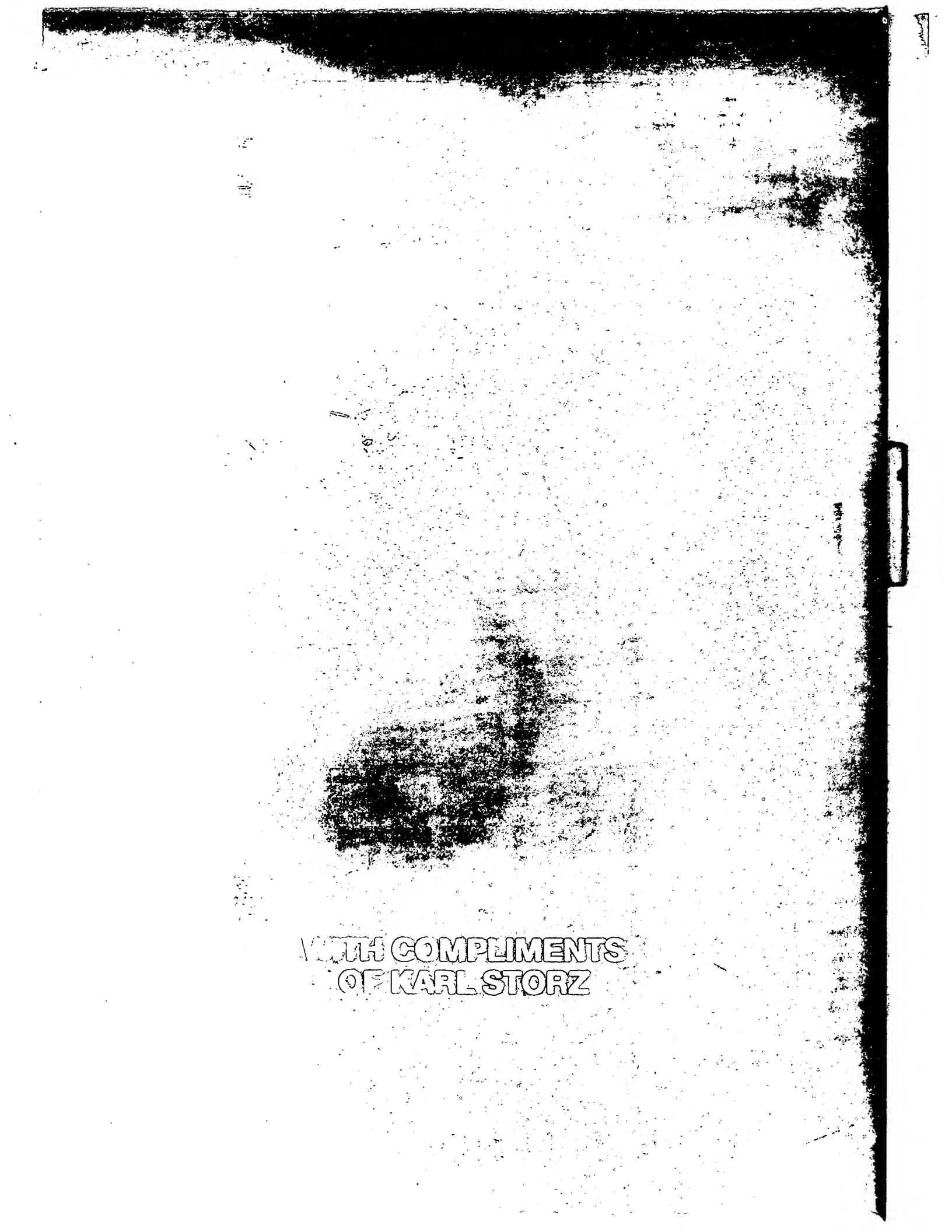


Fig. 12
Hugh tonsils (in the adult) can sometimes make the introduction of the MacIntosh blade difficult.

Fig. 14
Advancement of the ETT is precisely performed and observed by the entire OR Team.


WITH COMPLIMENTS
OF KARL STORZ